

1. Sketch a complete graph of $f(x)$. Remember that your graph is the solution, so show appropriate detail including the coordinates of all corner points.

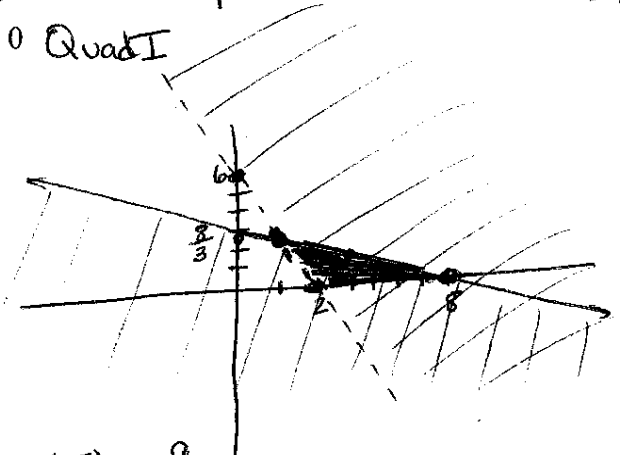
⑨ $f(x) = \begin{cases} 3x + y > 6 \\ x + 3y \leq 8 \\ x \geq 0, y \geq 0 \end{cases}$ Quad I

$3x + y > 6$
 $y > -3x + 6$

$x + 3y \leq 8$
 $3y \leq -x + 8$
 $\frac{3y}{3} \leq \frac{-x + 8}{3}$
 $y \leq -\frac{1}{3}x + \frac{8}{3}$

$-3x + 6 = -\frac{1}{3}x + \frac{8}{3}$
 $-9x + 18 = -x + 8$
 $-8x = -10$
 $\frac{-8x}{-8} = \frac{-10}{-8}$
 $x = \frac{5}{4}$

$3(\frac{5}{4}) + y = 6$
 $y = 6 - 3(\frac{5}{4}) = \frac{9}{4}$



corner points
(8, 0)
(2, 0)
($\frac{5}{4}, \frac{9}{4}$)

2. A company manufactures two types of leaf blowers, an electric model and a gas-powered model. The company's production plan calls for the production of at least 590 blowers per month.

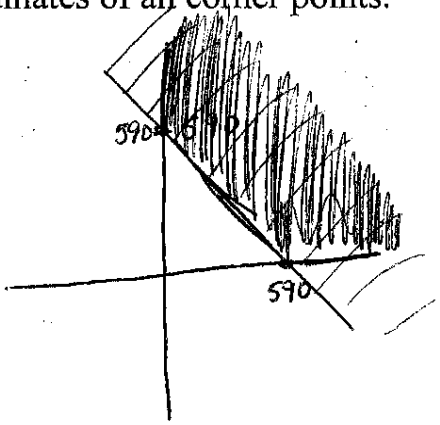
a.) Write an inequality that describes the production plan for x electric blowers and y gas-powered blowers.

⑧ $\begin{cases} x + y \geq 590 \\ x \geq 0, y \geq 0 \end{cases}$

b.) Sketch a complete graph. Remember that your graph is the solution, so show appropriate detail including the coordinates of all corner points.

$x + y \geq 590$
 $y \geq -x + 590$
Quad I

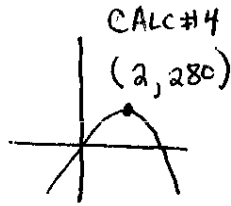
corner points
(0, 590)
(590, 0)



3. The rate of photosynthesis R for a certain plant depends on the intensity of light, x in lumens, according to $R(x) = 280x - 70x^2$.

a.) What is the intensity needed to maximize the rate of photosynthesis?

⑦



OR

$$x = \frac{-b}{2a}$$

$$x = \frac{-280}{2(-70)} = 2$$

$$y = 280(2) - 70(2)^2 = 280$$

$$x = 2 \text{ lumens}$$

b.) What is the maximum possible rate of photosynthesis?

⑦

$$y = 280$$

c.) Find the x -intercepts.

$$R(x) = 280x - 70x^2$$

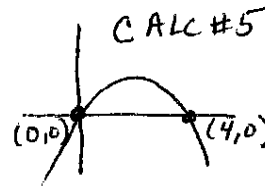
$$R(x) = 70x(4 - x)$$

$$0 = 70x(4 - x)$$

$$x = 0 \quad x = 4$$

$$(0, 0) \quad (4, 0)$$

OR



$$\text{OR } a = -70 \quad b = 280 \quad c = 0$$

$$x = \frac{-280 \pm \sqrt{280^2 - 4(-70)(0)}}{2(-70)} = \frac{-280 \pm 280}{-140}$$

$$= 0, 4$$

d.) State the meaning of the x -intercepts in the context of the problem.

⑦

(0, 0)
 ↓ intensity lumens ↘ rate photosynthesis

(4, 0)
 ↓ intensity ↘ rate photosyn

With a light intensity of 0 or 4 lumens, the plant is not conducting photosynthesis.

4. Given $f(x) = 5x^2 + 9x - 3$. Find the vertex **algebraically**.

$$a = 5 \quad b = 9$$

$$v(-.9, -7.05)$$

⑧

$$x = \frac{-b}{2a} = \frac{-9}{2(5)} = \frac{-9}{10}$$

$$y = \frac{5}{1} \left(\frac{-9}{10}\right)^2 + \frac{9}{1} \left(\frac{-9}{10}\right) - 3 = \frac{-141}{20}$$

$$v\left(-\frac{9}{10}, \frac{-141}{20}\right)$$

5. Given $f(x) = 12x^2 + 13x - 4$.

a.) Find the x -intercepts by a method of your choice.

$a = 12 \quad b = 13 \quad c = -4$

⑧
$$x = \frac{-13 \pm \sqrt{13^2 - 4(12)(-4)}}{2(12)}$$

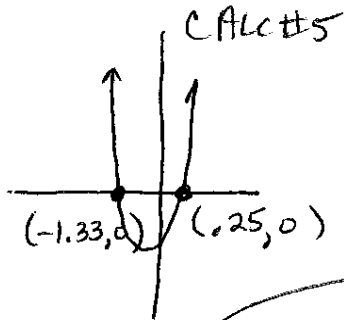
$$x = \frac{-13 \pm \sqrt{169 + 192}}{24}$$

$$x = \frac{-13 \pm \sqrt{361}}{24} = \frac{-13 \pm 19}{24} = \left(\frac{1}{4}, \frac{-4}{3} \right)$$

OR $(4x - 1)(3x + 4) = 0$
 $4x - 1 = 0 \quad 3x + 4 = 0$
 $4x = 1 \quad 3x = -4$
 $x = \frac{1}{4} \quad x = \frac{-4}{3}$

b.) Find the x -intercepts again by a different method than used above.

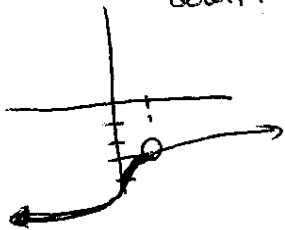
⑧



$x = -1.\bar{3}, 0.25$

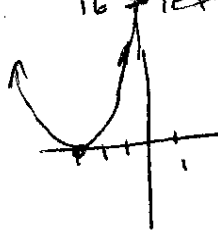
6. Show a complete sketch of the graph of $f(x) = \begin{cases} \sqrt[3]{x} - 4; & x < 1 \\ (x+3)^2; & x \geq 1 \end{cases}$

$y = \sqrt[3]{x} - 4$
down 4

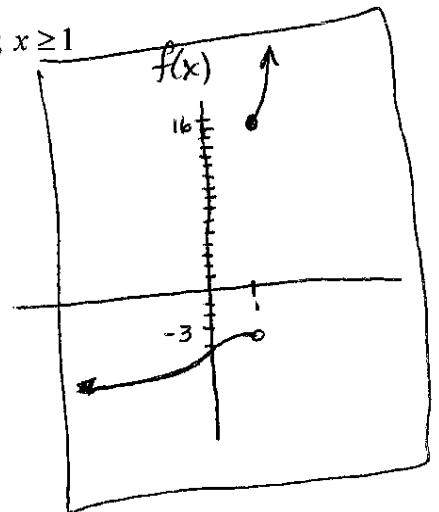


x	y
1	$\sqrt[3]{1} - 4 = -3$

$y = (x+3)^2$
16 left 3



x	y
1	$(1+3)^2 = 16$



⑧

7. The table below gives lawnmower rental rates as a function of the number of hours the lawnmower is rented.

Number of Hours	$1 \leq x < 2$	$2 \leq x < 4$	$4 \leq x < 8$
Rental Rate	16.69	25.20	33.71

a.) Complete the equation that models this problem.

⑦
$$f(x) = \begin{cases} 16.69 & ; 1 \leq x < 2 \\ 25.20 & ; 2 \leq x < 4 \\ 33.71 & ; 4 \leq x < 8 \end{cases}$$

b.) Show a complete sketch of the graph.

